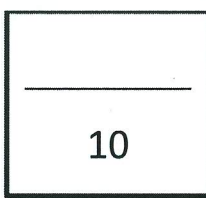


See # 7



Name:

ID No.:

Serial No.:

11

1. Evaluate  $I = \int_1^4 \frac{\ln 2 \log_2 s}{s} ds$ .

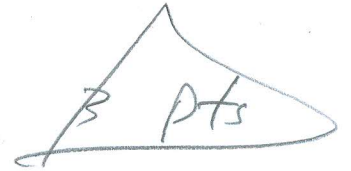
$$I = \int_1^4 \frac{\ln 2 \left( \frac{\ln s}{\ln 2} \right)}{s} ds \quad (1)$$

$$= \int_1^4 \frac{\ln s}{s} ds = \left[ \frac{(\ln s)^2}{2} \right]_1^4 \quad (1)$$

$$= \frac{1}{2} [(\ln 4)^2 - (\ln 1)^2]$$

$$= \frac{1}{2} (\ln 4)^2 = 2 (\ln 2)^2 \quad (1)$$

(Q39, page 426)

2. Evaluate  $\int_0^{\pi/2} 2 \sinh(\sin \theta) \cos \theta d\theta = \bar{I}$ 

$$\text{let } u = \sin \theta, \quad du = \cos \theta d\theta$$

when  $\theta = 0$ ,  $u = \sin 0 = 0$   
 $\theta = \frac{\pi}{2}$ ,  $u = \sin \frac{\pi}{2} = 1$

$$\bar{I} = 2 \int_0^1 \sinh u du = 2 \left[ \cosh u \right]_0^1 \quad (1)$$

$$= 2 [\cosh 1 - \cosh 0]$$

$$= 2 \left[ \frac{e^1 + e^{-1}}{2} - \frac{e^0 + e^0}{2} \right]$$

$$= [e^1 + e^{-1} - 2] \quad (1)$$

(Q56, page 442)



3. Find  $\int \sin(\ln x^2) dx = I$

Let  $u = \sin(\ln x^2)$ ,  $dv = dx$   
 $du = \cos(\ln x^2) \cdot \frac{1}{x^2} 2x dx$   $v = x$

①

Then  $I = x \sin(\ln x^2) - \int x \cos(\ln x^2) \cdot \frac{2x}{x^2} dx$  4 pts

①

$$= x \sin(\ln x^2) - 2 \int \cos(\ln x^2) dx$$

Let  $u = \cos(\ln x^2)$ ,  $dv = dx$   
 $du = -\sin(\ln x^2) \cdot \frac{2x}{x^2} dx$   $v = x$

①

So  $I = x \sin(\ln x^2) - 2 \left[ x \cos(\ln x^2) + 2 \int \sin(\ln x^2) dx \right]$

$\Rightarrow I = \frac{1}{5} \left[ x \sin(\ln x^2) - 2x \cos(\ln x^2) \right] + C$

①

4. Evaluate  $\int_1^e \frac{dt}{t\sqrt{1+(\ln t)^2}}$

Sorry this is from 8.3 (8.3)